

AMENDMENTS TO THE SPECIFICATION:

Please replace the Abstract of the Disclosure with the following rewritten Abstract provided on a separate sheet in the Appendix.

Page 1, on line 5, insert the following heading:

B1 --BACKGROUND OF THE INVENTION--

Page 1, replace the paragraph, beginning on line 6, with the following amended paragraph:

B2 The present invention relates to a belt for use in a Continuously Variable Transmission ~~as defined by the preamble of claim 1.~~

Page 1, between lines 7 and 8, insert the following heading:

B3 --DESCRIPTION OF THE RELATED ART--

Page 1, replace the paragraph, beginning on line 14, with the following:

B4 --Despite the known belt is at present commercially available for more than a decade, and is technically known for even many more years, it is in practice still found that the endurance time of belts may still be significantly improved.

SUMMARY OF THE INVENTION

It is therefor an object of the invention to enhance durability of the known belt while maintaining and preferably improving the power transmitting capacity of the known belt.

B4  
According to the present invention this may in a surprisingly simple manner be achieved by ~~applying the feature of the characterising portion of claim 1 that described below.--~~

Page 2, replace the paragraph, beginning on line 8, with the following amended paragraph:

B5  
--Both ~~said~~ abstract and ~~said~~ US patent No. 4579549 suggest the characteristic of play between rings of a set to be important in relation to life time of a belt. These documents however provide a measure effecting a confusingly inverse effect on distribution of belt tension in the rings of a set.--

Page 2, replace the paragraph, beginning on line 12, with the following amended paragraph:

B6  
--As to US patent No. 3720113, when interpreted with the teaching of ~~said~~ US patent No. 4579549, pointing to play between rings, it is found that rings of the first known belt "are super imposed with practically no play." For a practical implementation and for use as a starting point for improvement, this indication is too vague. An obvious interpretation of this teaching however, would be to utilise the inverse expression, indicating that the rings are superimposed with some play, be it practically absent. Belts of this nature are likely to show the distribution of tensile stresses conforming to the distribution shown as prior art in US-4579549, i.e. will have highest tensile stress at the innermost ring. Adopting the solution of the latter

B6  
US-4579549 document, it is unsatisfactory found that this solution leads to still one weakest ring, however, now located at the outermost side of a ring set.--

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Page 3, replace the paragraph, beginning on line 1, with the following amended paragraph:

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B7  
--In order to reproduce the above effect in a sufficiently consistent and reliable manner a favoured embodiment according to the invention requires that the nominal value of zero is realised by a tolerance of 0.00005 times the outer diameter of the inner ring of a relevant pair of rings, plus or minus of said the diameter. The technical effect of this measure according to the invention is that the differences of lifetime effect will remain within an accepted bandwidth for technically equivalent belts. In further detail of this effect, it will be found ~~that~~ that no significant difference in life time can be remarked as a consequence of this measure, since the effect hereof is that the spread of life time consequence of this measure will normally remain within the natural life time spread caused by metal fatigue.--

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Page 3, replace the paragraph, beginning on line 11, with the following amended paragraph:

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B8  
--Yet another preferred embodiment of the invention requires the mutual play between the innermost pair of adjacent rings is of negative value. It is acknowledged by the invention

B8  
that the innermost ring of a set, as described by US-4579549, "is subjected to both tensile forces and frictional forces". However, as indicated ~~by the measure according to claim 1~~ below, the measure subsequently taught by said publication is rejected. Rather, the favoured embodiment applies the idea underlying the present invention to solve the problem of the first ring, i.e. to take account of the tension each ring is individually subjected to. Combining this idea with the insight underlying the invention that the innermost ring is subjected to certain forces specific thereto, it was found according to this specific aspect of the invention that the tensile stress should be kept relatively low in order to keep the total level of stress in the innermost ring at a level conforming to the level in remainder of the rings of a set. In this respect it was recognised that the frictional force following from interaction between the innermost ring and the transverse elements as mentioned in US-4579549, when compared to frictional force resulting from ring-ring interactions is high, so that an additional frictional force should be calculated with for the innermost ring. At the innermost ring it should further be calculated with so-called Herze tensions resulting from element-ring contact. A favoured manner of keeping the level of tension in the innermost ring at the level of the in-between rings of a set is, according to the invention, to reduce the

B8 tensile stress by providing some negative play for the innermost ring only.--

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Page 3, replace the paragraph, beginning on line 31, bridging pages 3 and 4, with the following amended paragraph:

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B9 --In a further advancement of above ~~said~~ measure directed to the play of the innermost ring specifically, the invention is further characterised in that the outermost diameter of the innermost ring is of a value  $(1-Z)$  times the inner diameter of the adjacent ring,  $Z$  being of a value smaller than 0.0008. A technical effect of the so specifically identified range is that the reliability and consistency of the effect of the measure related to the innermost belt is increased, while taking into account further sources of tension specific to the innermost belt, including e.g. so called Herze tensions originating from the element-ring contacts. In this respect the value of greater than 0,0001 effects yet a further enhancement. It will be found that, although the parameter  $Z$  to some ~~extend~~ extent varies with the application of a relevant belt, a belt is stressed in conformance with the in-between ring, thus having a conforming life time, when the parameter  $Z$  is kept in the above ~~said~~ the range.--

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Page 4, replace the paragraph, beginning on line 26, bridging pages 4 and 5, with the following amended paragraph:

B10

--A particular aspect of the invention is characterised in that the thickness of one or both of the innermost and the outermost ring of the set is significantly by less than the nominal thickness of in between rings of the set. The invention therefor also relates to a belt for use in a continuously variable transmission, in particular for automotive application, comprising at least one set of nested metal rings, the set interacting with transverse elements provided slidably along the set, and the rings of the set being accommodated with small mutual play between each pair of adjacent rings, whereby the thickness of one or both of the innermost and the outermost ring of the set is significantly less than the nominal thickness of in between rings of the set. With such a measure the invention provides an alternative means of realising an evenly distributed tension level over the rings of a set. The insight utilised in this invention is that a smaller thickness realises a lower bending stress in the relevant ring thereby lowering the tension level in ~~said~~ the innermost and/or outermost ring, allowing the relevant ring to receive tension from sources specific therefor, without penalty in regard of life time.--

Page 5, replace the paragraph, beginning on line 5, with the following amended paragraph:

B11

--Yet another particular aspect of the invention relates to the measure wherein the material composition of at

B11  
least one of the innermost and the outermost ring of the set significantly differs from that of the in between rings of the set, such that the elasticity modulus thereof is significantly lower than that of in between positioned rings. The invention therefor also relates to a belt, ~~in particular according to any of the preceding claims,~~ for use in a continuously variable transmission, in particular for automotive application, comprising at least one set of nested metal rings, the set interacting with transverse elements provided slidably along the set, and the rings of the set being accommodated with small mutual play between each pair of adjacent rings, whereby the elasticity modulus of one or both of the innermost and the outermost ring of the set is significantly less than the nominal thickness of in between rings of the set. With such a measure get another alternative for realising an evenly distributed tension over all rings of a set is realised. The technical effect is comparable to the preceding alternative.--

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Page 5, replace the paragraph, beginning on line 19, with the following amended paragraph:

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B12  
--In a further elaboration of the latter aspects the value for thickness and elasticity modulus of ~~said~~ the innermost and ~~said~~ the outermost ring is at least twenty percent (20%) less than the average value of ~~said~~ the parameters at the in-between rings. When the values of this specific ranges are followed, the

B12  
technical effect in durability and torque to be transmitted,  
indicated a.o. at the range for the innermost ring, will be  
further enhanced.--

Page 5, between lines 24 and 25, insert the following  
heading:

B13 --BRIEF DESCRIPTION OF THE DRAWINGS--

Page 6, before line 2, insert the following heading:

B14 --DESCRIPTION OF THE PREFERRED EMBODIMENTS--

Page 6, replace the paragraph, beginning on line 2,  
with the following amended paragraph:

B15  
--Figure 1 shows schematically a continuous variable  
transmission (CVT) suitable amongst others for automotive  
application, with a conveyor belt 1, made up of a carrier in the  
form of a nested set of endless thin bands 2, otherwise denoted  
rings 2 and a multitude of separate transverse elements 3,  
otherwise denoted blocks 3. The elements 3 are arranged freely  
slidably along ~~said~~ the carrier 7 in an endless, virtually  
continuous series. The carrier 7, alternatively denoted support  
and ring set is composed of a number of the in endless bands,  
alternatively denoted loops or rings. For operational application  
the belt 3 runs within the V-shaped groove of the pulleys 1 and 2  
with steplessly variable diameter. Its elements 6 are provided  
with inclined contact faces for contacting the sheaves 4 and 5 of  
~~said~~ the pulleys. The pulleys 1 and 2 are provided on shafts P



B15  
and S respectively. When pinched sufficiently strong between the sheaves of a pulley 1, 2 the belt 3 transmits force from one rotating pulley to the other. The elements 6, as seen in cross section preferably have a lower part of which at least one principle side is inclined relative to the upper part at the same side, so that the element 6 becomes thinner towards the side directed to the inner side of the belt. Such a continuous variable transmission is known per se. The elements 6 further are provided with generally slightly convexely shaped contact faces also denoted saddles for contacting the support 7, in particular the innermost band thereof.--

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Page 7, replace the paragraph, beginning on line 17, with the following amended paragraph:

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B16  
--Figure 5 is a figurative representation of the highest possible tension S occurring in any above mentioned parts or trajectories passed during operation of the belt, plotted for each ring N of a ring set, here provided with 10 rings. Number 1 in the plot stands for the innermost ring of the set, whereas No. 10 stands for the outermost ring. A similar plot can be made up for any number of rings in a set. The broken line in figure [[4]] 5 represents a commercially available belt provided with practically no play, i.e. with at least some play between the rings. The solid line represents the tension in each ring of a belt according to the present invention in which the play between

B7C  
the ring has, as expressed in technical terms, a nominal value of zero. In common language this means that an inner ring of any pair of rings of a set may have some play relative to the outer ring, or may be somewhat longer than the inner diameter of the outer ring. In technical terms these states are denoted positive and negative play respectively. The notion nominal further includes that the average value of plays of a given number of pairs of rings is zero. In technical sense this zero value includes a certain margin. In the construction a favourable embodiment of the margin would be 0.00005 times the outer diameter of an inner ring of any pair of a set in each direction, i.e. plus or minus of ~~said~~ the outer diameter.--

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